

111. DATA COLLECTION

A. Introduction

One of the first steps necessary in developing settlement formulas is compiling accurate data. This section describes the sources and **types** of data NECA collected to support average schedule formula development. For the 2003 Modification of Average Schedules, NECA gathered data from several different sources, including NECA's settlement system, NECA's annual data collection, NECA's Cost Study Database, network schematics and line haul worksheets, Tariff No. **4**, the Customer Database, and **SS7** investment and expense information.

An overview of NECA's annual data collection from sample cost and average schedule study **areas** is discussed in Section III.B. NECA requested demand data from both sample' cost and average schedule study areas and accounting data from sample average schedule study areas.

Cost company accounting data comes from the sampled cost company's annual cost separations studies submitted to NECA as described in Section III.C. These data are used to develop statistical models of separations (Part **36**) and access allocations (**Part 69**), which are applied to average schedule companies.

Since average schedule companies do not perform cost separations studies, the sampled average schedule companies report financial data to NECA at a total company level. Collection of these data is described in Section III.D.

Demand data reported to the NECA pool by average schedule companies are used to forecast base period demand to the test period and to calculate average schedule separations and allocation factors

¹ The selection of the annual sample is described in Section II.

needed to derive revenue requirements. Forecasted demand is used to create new settlement formula models. Section III.E details the sources of cost company and average schedule demand data.

Section III.F discusses the demand and accounting data used for **high** traffic volume average schedule companies.

Section III.G summarizes the collection of average schedule line haul demand data supporting development of the distance sensitive and non-distance sensitive line haul formulas, and describes how circuit mile data were obtained **ffom** sample cost companies in order to develop **Part 36** separation factor models for Central Office Equipment Category **4.3** and for Cable & Wire Facilities Categories **1.3** and **4**.

Section III.H describes the collection of **SS7** cost data and A-Link access information **ffom** average schedule companies.

All the **data** listed above were subjected to several edit checks to ensure their validity. As in the past, the data were screened to ensure accuracy in developing the proposed **2003** average schedule formulas. Company personnel or source documents were consulted whenever questions or inconsistencies arose to determine if corrections should be made. Section III.I describes the edits performed on each **type** of data.

The methods outlined in Section III produced the validated data that was used throughout this study.

B. NECA's Annual Data Collection

In 2000 and 2001, **NECA** requested demand data from both sample cost and average schedule study areas and accounting data from sample average schedule study areas to support development of average schedule settlement formulas, tariff rates, the average schedule **USF** loop cost formula and the average schedule local switching support formula. The 2000 sample provided accounting data from calendar years 1998 and 1999 and demand data from 2000. The 2001 sample provided accounting data from calendar years 1999 and 2000 and demand data from 2001. Sample companies for both years were based on the sample design, described in Section II.

As in the past, **NECA** personnel offered to assist companies in completing the data forms. Many companies availed themselves of this opportunity. In some cases, this assistance took the form of telephone consultation with representatives from the sample companies. In other cases, **NECA** personnel compiled data from company source documents on behalf of companies. This additional assistance is sometimes needed by smaller companies lacking the personnel and resources required to respond fully to the data request.

The 2000 annual data collection requested data from 130 cost study areas. Ten of these study areas were excluded from this study. Of these, one did not submit a cost study to **NECA**. Four others were excluded because they were either acquired by a Price Cap company, or merged into another study area and no longer participate in **NECA's** pool. Five others were excluded because of insufficient data. A total of 120 cost study areas were used from the 2000 annual data collection.

The 2000 annual data collection also requested data from 110 average schedule study areas. Of these three study areas did not participate due to lack of personnel and/or resources.

The 2001 annual data collection requested data from 133 cost study areas. Ten of these study areas were excluded from ~~this~~ study. Of these, one had merged into another study area. Nine others were excluded because sufficient data **was** unavailable. Several of these had recently converted from average schedule to cost and did not have cost data available for the point in time requested. Data from the remaining 123 cost study areas were combined with data from the 120 cost study areas in the 2000 annual data collection. As a result, the two years of data collection yielded valid data from 243 cost study areas.

The 2001 annual data collection also requested data from 105 average schedule study areas. Of these, two study areas did not participate due to lack of resources to complete the survey. In addition, two more study areas were excluded from the study because of lack of sufficient and accurate support documents. Data from the remaining 101 average schedule study areas were combined with data from the 107 average schedule study areas in the 2000 annual data collection. As a result, the two years of data collection yielded valid data from 208 average schedule study **areas**. Excluded from this number are study areas that were selected in the sample design as average schedule, but since converted to cost.

C. Cost Company Cost Data

NECA used detailed cost study data as the foundation of average schedule separations and allocation models (discussed in Section IV). As part of its member company data review activities, NECA routinely acquires cost company cost studies to validate pool settlement distributions and to support

tariff rate filings.

In 2001, all cost companies participating in the NECA pools were asked to provide a copy of their 2000 cost studies, showing total company (~~Part~~ 32) amounts, total interstate (~~Part~~ 36) amounts, and access category (~~Part~~ 69) amounts. ~~The~~ data, submitted annually, was entered into NECA's cost study separations/allocator software program. NECA personnel reconciled discrepancies between the calculation results of its cost study program and results from the exchange carrier's cost studies. ~~This~~ reconciliation process provided additional assurance that cost studies are performed in accordance with Commission rules and orders, and that the data necessary for calculating separations transitions are present? The use of a single allocator program also provided NECA with a uniform data format for the analyses performed in *this* Study. The data was placed in NECA's Cost Study Database. Sample cost data is provided in Appendix B1.

D. Average Schedule Company Accounting Data

Average Schedule company accounting data were used to develop the ~~Part~~ 69 revenue requirements, described in Section VI.

Total company account specific data (~~Part~~ 32) from calendar years 1999 and 2000 were requested from each average schedule study area in the 2001 sample. These companies were required to exclude from reported account balances, costs associated with non-regulated activities, in accordance with the Commission's Part 64 rules. Each company was also asked to supply copies of 1999 and 2000 financial documents supporting its accounting data, such as summarized General Ledgers,

² *See, e.g.*, Safeguards to Improve the Administration of Interstate Access Tariff and Revenue Distribution Process, CC Docket No. 93-6, NECA Comments (filed April 14, 1993) at Attachment A, pp. 1-3.

Annual Reports or final Trial Balances. These documents were used as sources for the verification steps described in Section III. The 1999 and 2000 accounting data from the 2001 sample are displayed in Appendices C1 and C2, respectively.

Similar accounting data from calendar years 1998 and 1999 were obtained from average schedule study areas in the 2000 sample. Sourced documents for these data were also obtained for verification purposes. Average schedule company accounting data obtained from the 2000 sample are displayed in Appendices C4 and C5.

E. Demand Data

Demand data from sample cost study **areas** were necessary to support the separation factor modeling described in Section N.D.

Demand data for study areas in the average schedule sample, reported to the NECA Settlement System, were used to develop demand forecasts, calculate average schedule separations and allocation factors, compute revenue requirements and create new settlement formula models.

Demand data were extracted from the following sources:

1. Data reported to NECA's Settlement System or Customer Database.
 - a. For average schedule companies, NECA used the average month of the period from July 2001 **through** June 2002, including all adjustments **through**

July 2002 for the following data elements:³

- Common Line Access Lines
- Traffic Sensitive Switched Access Minutes of Use
- Number of Exchanges
- Switched Interstate Circuit Terminations
- Interstate Circuit Miles
- Intertoll Dial Circuits
- Interstate Circuits
- Special Access Revenues

b. For average schedule companies, NECA used the average month of the period from January 1999 ~~through~~ December 2000, including all adjustments ~~through~~ September 2002 for the analyses underlying the forecast of Interstate Special Access Revenues⁴, described in Section V.H.1.

c. SS7 facility and cost data reported to NECA's **SS7** database

- SS7 capital investment in Service Switching Points (**SSPs**) and Consolidation Points (**CPs**)

³ Throughout the remainder of this Filing, Common Line Access Lines are referred to as "access lines"; Traffic Sensitive Switched Access Minutes ~~are~~ referred to as "access minutes"; Switched Interstate Circuit Terminations are referred to as "circuit terminations" and Interstate Circuit Miles are referred to as "circuit miles".

⁴ Average schedule and cost interstate special access revenues have been adjusted to reflect revenues that would have been collected if average schedule companies had achieved the authorized rate of return during all of the historical data months examined. Section V.H.1 describes the development of the rate of return adjustment factors. Adjusted special access revenues are referred to in this Filing as "adjusted special access revenues."

- SS7 capital investment in Service Switching Points (SSPs) and Consolidation Points (CPs)
 - Location and number of fully connected or partially connected SSPs
 - Location and number of CP Data links
 - A-link providers
- d. For cost companies, NECA used the average month of the period from January 2000 **through** December 2000⁵, including all adjustments **through** May 2002 for the following data elements:
 - Common Line Access Lines
 - Common Line Minutes of Use
 - Traffic Sensitive Switched Access Minutes of Use⁶
 - Special Access Revenues
 - Number of Exchanges

⁵ Cost company demand data from 2000 correspond to 2000 cost studies used in this average schedule Filing, the latest available for this analysis.

⁶ Since cost companies report common line access minutes on a monthly basis, but do not report traffic sensitive switched access minutes **as** average schedule companies do, NECA derived cost company traffic sensitive switched access minutes **from** their reported common line access minutes data. NECA used a simple regression estimation technique based on **data** reported by average schedule study areas for settlements to estimate the ratio of traffic sensitive to common line access minutes for cost companies. This ratio was used to calculate traffic sensitive access minutes for each sample cost study area. Influential points were identified and accommodated using the method described in Section IV.C. The model follows:

$$\text{Traffic Sensitive Access Minutes} = 1.000451 \times \text{Premium Common Line Access Minutes}$$

$$R^2 = 0.9999 \quad t\text{-statistic} = 2,241.38 \quad F\text{-statistic} = 5,023,776$$

2. Cost company documents and schematics, describing exchange locations at remote offices reported in response to the 2000 and 2001 sample data requests. Included in these documents are the following:
 - Working Lines
 - Route Miles
3. Interstate toll circuit miles from the 2000 Cost Study database derived from:
 - Interstate Message Circuit Miles
 - Joint Message Total Circuit Miles
 - Interstate Conversation Minute-Mile Factor
4. Cost company exchange counts from NECA's Customer Database supplemented by Tariff No. 4.

Demand data from sample average schedule and cost study areas are displayed in Appendices D1, and D2, respectively.

F. Average Schedule High Traffic Volume Demand and Accounting Data

In this Filing, NECA documents special analyses of accounting and demand data of average schedule study areas with high traffic volumes. To support these analyses, NECA used accounting data from the 2000 and 2001 data collection and demand data reported for settlements that were coincident with each of these calendar years. A company was designated as having **high** traffic volume if its minutes of use per access line per month exceeded 350 during the data years included in this study. Wherever possible, the accounting data from the highest traffic volume year between 1998 and 2000

was used. If no accounting data was available during the highest traffic year, the period with the next highest traffic volume was selected. Accounting data used in this study are displayed in Appendix C3. Demand data for the high traffic volume study areas corresponding to the accounting data year (1998, 1999 or 2000) were selected from the NECA settlement system and are displayed in Appendix D3.

G. Line Haul Data

Average schedule line haul demand data (i.e., circuit miles, circuit terminations and interstate circuits) are used to calculate separations factors and to support the development of the Line Haul Distance Sensitive, Line Haul Non-Distance Sensitive, and **SS7** settlement formulas. Cost company line haul data are used to develop Part **36** separation factor models for Central Office Equipment Category **4.3** and for Cable & Wire Facilities Categories 1.3 and **4**, as described in Section IV.

1. Average Schedule Companies

NECA procedures require average schedule study areas to provide updated line haul worksheets and schematics at least once a year or whenever significant changes occur in their transport networks. Carriers report counts of access lines, as well as counts **of** circuits, circuit miles and circuit terminations, to NECA to support their settlement claims.

To determine which study areas required updates of line haul schematics, NECA compared line haul demand **from** its database with line haul demand reported to the monthly settlement system. Average schedule study areas whose settlement reports indicated material differences when compared with data in the line haul database, were asked to reconcile these differences and provide updates in time for use in **this** average schedule study. Each average

schedule sample company's circuits, circuit miles and circuit terminations data, as reported to the NECA settlement system, are displayed in Appendix D1.

2. Cost Companies

Cost company circuit mile data were obtained by combining interstate circuit miles to remote switches with interstate toll circuit miles connected to other switches, as reported in 2000 cost studies. Circuit miles to remote offices were derived from counts of circuits at remote offices (determined according to NECA's Traffic Engineering Circuit Count Method)⁷ and route miles to remote offices.

Total Circuit Miles = Interstate Toll Circuit Miles + Interstate Circuit Miles at Remote Offices

***Interstate Toll Circuit Miles = Interstate Message Circuit Miles
+ Joint Message Interstate Circuit Miles***

***Joint Message Interstate Circuit Miles = Joint Message Total Circuit miles
x 2000 Cost Study Interstate Conversation Minute-Mile Factor***

The traffic engineering method uses route mile data and access line counts at each remote office to develop circuit miles. NECA determined that 164 sample cost companies have host/remote circuits (COE Category 4.3 equipment). Sample cost companies provided route mile data and access line counts at each remote office. Sample cost company total interstate

⁷ The circuit count method is first described in Exhibit 5.11 of NECA's 1994 Modification of Average Schedules, and has been included in NECA's Pool Administration Procedures for Average Schedule Companies. See National Exchange Carrier Association, Inc., 1994 Modification of Average Schedules, Dec. 30, 1993 at V-35.

circuit mile data are displayed in Appendix D2.

H. Signaling System 7 (SS7) Data

NECA collects Signaling System 7 (SS7) network configuration and cost data for Service Switching Points (SSPs) and Consolidation Points (CPs) installed by average schedule companies that receive SS7 settlements.

One set of data is collected from average schedule exchange carriers that have installed SSP or CP equipment and **are** connected to the nationwide signaling network or are expected to connect to the network during the 2003/2004 settlement period. Information on SSP or CP equipment investment and expenses related to the provision of SS7 signaling links (e.g., CP data links) was collected, and the STP or access service provider was identified. NECA collects data on the connection charges of these access service providers. These data are displayed in Appendix **G**. NECA used these data to update the SS7 settlement formula for those exchange carriers connected to the nationwide SS7 signaling network, as described in Section VII.J.1.

Another set of data is collected from average schedule exchange carriers that have installed SSP or CP equipment, but have not yet connected to the nationwide signaling network. Types of investments incurred by these companies are the same **as** those connected to the network, except that they do not pay for links connecting their SSP to the network. These data, displayed in Appendix **G**, were used to update the SS7 settlement formula for those exchange carriers not yet connected to the nationwide signaling network, as described in Section VII.J.2.

Data from SSP's that were reported with incomplete cost data were replaced with the average cost of SSP's of the same model type. In a few cases, when the carrier did not identify the model type of SSP, the overall average cost **was** used.

I. Data Edits

a) Cost Study Area Part 32, Part 36 and Part 69 Data Edits

Several edits were performed on cost study area data to ensure completeness and accuracy. The methods used for these edits included the following steps:

1. Results from NECA's cost study program were reconciled with results provided by sample companies.
2. Cost study data entries were reviewed for completeness.
3. Related accounts were compared for consistency.
4. Access element amounts were compared to total company and total interstate amounts.
5. Data review ensured sufficient level of detail to conduct cost study analyses.

b) Average Schedule Study Area Accounting Data Edits

Several edits were performed on average schedule study area accounting data to ensure completeness and accuracy. The methods used for these edits included the following steps:

1. Accounting source documents were compared to data reporting forms to ensure that the data were reported correctly.

2. A review of data ensured that all study areas provided sufficient account detail.
3. Individual study area investment per line and investment per minute ratios were compared to average sample ratios. Extreme values were investigated to ensure accuracy.
4. Individual accounts for each study area were compared to their total investments and expenses for reasonability.
5. Growth ratios of each account of each carrier were evaluated to ensure reasonability.

c) Demand Data Edits

Demand data used in this study were reviewed for consistency with prior reports and with NECA settlement procedures. Month-over-month and year-over-year comparisons were made to identify data anomalies and growth trend changes. Errors were corrected, and reasons for any inconsistencies were provided.

d) Signaling System 7 (SS7) Data Edits

The methods used for these edits included the following:

1. SS7 facility data were reviewed for consistency with source documents and settlement claims.
2. Source documents were reviewed to determine that SS7 cost components are complete.

IV. COST COMPANY ALLOCATION MODELS

A. Introduction

This section describes the use of cost study data provided by cost companies for the year ending December 2000.¹ These cost study data are used to calculate separated costs and to allocate separated costs to access categories, as discussed in Section IV.B, using FCC rules that apply to the test period (July 1, 2003 through June 30, 2004). From each cost study, NECA then calculates fractions of unseparated accounts that are allocated to interstate, and fractions of interstate accounts that are allocated to access categories. These separation and allocation fractions, in turn, are used in the construction of statistical models of separation and allocation ratios.

Because average schedule companies do not perform studies that produce cost separations and access category allocations, NECA uses these models in average schedule studies to allocate average schedule company accounts to access categories. As discussed in Section VI, the models are used to calculate values for the separations and allocations of accounts of each sample average schedule company.

The following is an illustration of a straight line equation model for separating an account.

$$\frac{\text{Interstate Cost in the Account}}{\text{Total Cost in the Account}} = 0.05 + (0.9 \times \text{Related Variable})$$

NECA employed the straight line equation form in some models and other forms in other models. Part 36 models are explained in Section IV.D.

¹ Data from 2001 cost studies do not become available until the second half of 2002, which was too late for inclusion in this Study.

Next, NECA used allocated cost study accounting data to model the allocation of interstate amounts to access categories (Part 69 models). These Part 69 models are explained in Section IV.E. An illustration follows:

$$\frac{\textit{Common Line Cost in the Account}}{\textit{Interstate Cost in the Account}} = 0.1 + (0.6 \times \textit{Related Variable})$$

To ensure that all models represent the average schedule population, influential data points were identified and accommodated according to the method described in Section IV.C. The outlier accommodation method was used for all separation and allocation models except for models with the independent variable being the separation fraction of another account prescribed by Part 36 rules. These cases exhibit a near perfect fit and outlier accommodation method would have been irrelevant.

B. Jurisdictional Cost Separations and Access Category Allocations

The following sections discuss cost allocation methods underlying data obtained from 2000 cost studies for cost companies in the 2000 and 2001 samples. The **summary** of cost allocation methods in Exhibit 4.1 describes factors used to separate and allocate sample cost company accounts for the test period.

1. Separation of Local Switching Investment

In an order released May 22, 2001, the FCC adopted the Federal-State Joint Board recommendation to impose an interim separations freeze effective July 1, 2001.² The freeze

² Jurisdictional Separations and Referral to the Federal-State Joint Board, CC Docket No. 80-286, **Report and Order**, 16 RCC Rcd 11382 (2001).

included all Part 36 category relationships and interstate separations factors for price cap carriers, and all interstate separations factors for rate-of-return carriers. The freeze is in effect for five years or until the Commission has completed comprehensive separations reform, whichever comes first.

As a result of the separations freeze, the Local Switching separations factor underlying the 2000 cost studies no longer needs to be projected to reflect the future test period. Therefore, in this average schedule study, NECA separated local switching investment using the 2000 Local Switching separations factor.

2. Scope of Changes to Separation and Allocation Methods

The MAG Order requires that part of General Purpose Computer (GPC) costs, which is included in General Support Facilities (GSF), is to be allocated to the Billing and Collection (B&C) category, effective January 1, 2002.³ NECA adjusted the 2000 cost studies to reflect this rule change. For each sample study area indicating that part of GPC costs were used to provide non-tariffed B&C services, NECA used 2002 investment amounts underlying the 2002 Annual Access Tariff Filing to develop a ratio of GPC costs used for non-tariffed B&C to total GSF costs. Then, each sample study area's ratio was multiplied by its total GSF amount from the 2000 cost study to estimate the amount of GPC in the 2000 cost study to be allocated to B&C. That amount was then allocated to B&C based upon rule 69.307 of the Commission's Rule published in the MAG Order. Remaining GSF costs were allocated using the existing GSF allocation methodology.

³ MAG Order at ¶ 115.

3. Summary of Cost Allocation Methods

Using the 2000 cost studies separations factors, NECA calculated interstate costs of each sample cost study. These calculated cost studies are shown in Appendix B1. Exhibit 4.1 summarizes the basis of this calculation. The first column of Exhibit 4.1 identifies accounts or categories. The second column identifies the basis of jurisdictional separations. The third column provides the basis for apportioning interstate accounts to access categories.

The entry "Cost Study" appearing in the second or third columns indicates that no change to the historical account allocation has been made. All other entries describe the basis of separations or allocation recalculations used to reflect the changes described above.

4. Cost Study Separations Factors

Using these recalculated interstate costs, a set of separations factors was calculated for each sample cost study area. The set includes one separations factor for each category of Central Office Equipment and Cable & Wire Facilities, and one factor for each of selected investment, expense, reserve, and tax calculation accounts. The separations factor is calculated as follows:

$$\text{Separations Factor} = \frac{\text{Interstate Cost in Category or Account}}{\text{Total Cost in Account}}$$

These separations factors were used as described in Section N.D to develop separations factor models.

5. Cost Study Access Allocation Factors

Using the recalculated accounts, a set of access allocation factors was calculated for each sample cost study area. The set includes one access allocation factor for each category of Central Office Equipment, Cable & Wire Facilities, and for certain investment accounts, expenses and reserves. These allocation factors were used **as** described in Section IV.E to develop allocation factor models.

EXHIBIT 4.1

COST SEPARATION AND ALLOCATION METHODS

<u>Account or Category</u>	<u>Part 36 Separations Basis</u>	<u>Part 69 Allocation Basis</u>
Central Office Equipment		
Category 1	Cost Study	Cost Study
Category 2	Cost Study	Cost Study
Category 3	Local Switching Separation Factor	Interstate portion is directly assigned to local switching element
Category 4.1 1	Cost Study	Cost Study
Category 4.12	Cost Study	Cost Study
Category 4.13	Prorate into Joint, interstate private line (PL) and intrastate PL based on 4.13 loops. Joint portion is separated 25% to interstate; PL portion is directly assigned to appropriate jurisdictions.	Joint portion is assigned to Base Factor Portion (BFP). PL portion is assigned to special access.
Category 4.2	Cost Study	Cost Study
Category 4.3	Cost Study	Cost study
Cable & Wire Facilities		
Category 1	Prorate into joint and PL based on Cat. 1 loops. Joint portion is separated 25% to interstate. PL portion is assigned to appropriate jurisdiction.	Joint portion is assigned to BFP. PL portion is assigned to special access.
Category 2	Cost Study	Cost Study
Category 3	Cost Study	Cost Study
Category 4	Cost Study	Cost Study
Information Originating/ Terminating Equipment		
Category 1	25% to Interstate	Prorate into public tel., limited pay and all other IOT based on splitting factors. Public tel. is assigned to pay element. Limited pay is assigned to limited pay element. All other IOT is assigned to Common Line BFP element.
Category 2	Cost Study	Cost Study

EXHIBIT 41 (Continued)

COST SEPARATION AND ALLOCATION METHODS

<u>Account or Category</u>	<u>Part 36 Separations Basis</u>	<u>Part 69 Allocation Basis</u>
General Support Facilities	COE + IOT + C&WF	COE+IOT+C&WF ⁴
Tangible Assets - Capital Lease		
General Support Facilities	General Support Assets	General Support Assets
Central Office Equipment		
Category 1	COE Cat. 1	COE Cat. 1
Category 2	COE Cat. 2	COE Cat. 2
Category 3	COE Cat. 3	COE Cat. 3
Category 4	COE Cat. 4	COE Cat. 4
Information Originating/ Terminating Equipment		
Category 1	IOT Cat. 1	IOT Cat. 1
Category 2	IOT Cat. 2	IOT Cat. 2
Cable & Wire Facilities		
Category 1	C&WF Cat. 1	C&WF Cat. 1
Category 2	C&WF Cat. 2	C&WF Cat. 2
Category 3	C&WF Cat. 3	C&WF Cat. 3
Category 4	C&WF Cat. 4	C&WF Cat. 4
Tangible Assets - Lease Hold Improvements		
General Support Facilities	General Support Assets	COE+IOT+C&WF+GSF
COE - Switching	COE Cat. 2 & COE Cat. 3	COE+IOT+C&WF+GSF
COE - Operator Equipment	COE Cat. 1	COE+IOT+C&WF+GSF
COE - Transmission	COE Cat. 4	COE+IOT+C&WF+GSF
Information Originating/ Terminating Equipment	IOT	COE+IOT+C&WF+GSF
Cable & Wire Facilities	C&WF	COE+IOT+C&WF+GSF
Intangible Assets	2001 Excluding 2690	COE+IOT+C&WF+GSF
Telecom. Plant Held for Future Telecom Use	2001	2001

⁴ NECA **has** also allocated some **GSF** cost to the B&C element, according to rule **69.307** of **the** Commission's Rule published in the MAG Order.

EXHIBIT 4.1 (Continued)

COST SEPARATION AND ALLOCATION METHODS

<u>Account or Category</u>	<u>Part 36 Separations Basis</u>	<u>Part 69 Allocation Basis</u>
Telecom Plant Under Construction (Includes AFUDC)	2001	2001
Telecom Plant Acquis. Adjustment	2001	2001
Materials & Supplies	C&WF	COE+IOT+C&WF+GSF
RTB Stock	2001	COE+IOT+C&WF+GSF
Cash Working Capital	Total Expenses Excluding Depreciation & Amortization Expense	COE+IOT+C&WF+GSF
Accumulated Depreciation		
General Support Facilities	GSF	GSF
COE - Switching	COE Cat. 2 + COE Cat. 3	COE Cat. 2 + COE Cat. 3
COE - Operator Equipment	COE Cat. 1	COE Cat. 1
COE - Transmission	COE Cat. 4	COE Cat. 4
Information Originating/Terminating Equipment	IOT	IOT
Cable & Wire Facilities	C&WF	C&WF
Property Held for Future Telecom Use	2002	COE+IOT+C&WF+GSF
Accumulated Amortization - Tangible	2680	Associated 2680 Investment
Accumulated Amortization - Intangible	2690	COE+IOT+C&WF+GSF
Accumulated Amortization - Other	2005	2005
Net Current Deferred Taxes		
General Support Facilities	GSF	GSF
COE - Switching	COE Cat. 2 + COE Cat. 3	COE Cat. 2 + COE Cat. 3
COE - Operator Equipment	COE Cat. 1	COE Cat. 1
COE - Transmission	COE Cat. 4	COE Cat. 4
Information Originating/Terminating Equipment	IOT	IOT
Cable & Wire Facilities	C&WF	C&WF
Not Classified	2001 Excluding Land	2001

EXHIBIT 4.1 (Continued)

COST SEPARATION AND ALLOCATION METHODS

<u>Account or Category</u>	<u>Part 36 Separations Basis</u>	<u>Part 69 Allocation Basis</u>
Net Non-Current Deferred Taxes		
General Support Facilities	GSF	GSF
COE - Switching	COE Cat. 2 + COE Cat. 3	COE Cat. 2 + COE Cat. 3
COE - Operator Equipment	COE Cat. 1	COE Cat. 1
COE - Transmission	COE Cat. 4	COE Cat. 4
Information Originating/ Terminating Equipment	IOT	IOT
Cable & Wire Facilities	C&WF	C&WF
Not Classified	2001 Excluding Land	2001
Network Support Expenses	GSF	COE+IOT+C&WF+GSF
General Support Expenses	GSF	GSF
COE Expenses - 6210 - 6220 - 6230	COE COE COE	COE 2210 COE 2220 COE 2230
C&WF Expenses	C&WF	C&WF
IOT Expenses	IOT	IOT
Other Property, Plant & Equipment Expenses	2001	COE+IOT+C&WF
Network Operations Expenses	COE+IOT+C&WF	COE+IOT+C&WF
Access Expenses	Cost Study	Cost Study
Depreciation & Amortization Expense		
General Support Facilities	GSF	GSF
COE - Switching	COE Cat. 2 + COE Cat. 3	COE Cat. 2 + COE Cat. 3
COE - Operator Equipment	COE Cat. 1	COE Cat. 1
COE - Transmission	COE Cat. 4	COE Cat. 4
Information Originating/ Terminating Equipment	IOT	IOT
Cable & Wire Facilities	C&WF	C&WF
Plant Held for Future Telecom. Use	2001	2001
Amortization - Tangible Assets	2680	2680
Amortization - Intangible Assets	2690	2690
Amortization - Other	2005	2005

EXHIBIT 4.1 (Continued)

COST SEPARATION AND ALLOCATION METHODS

<u>Account or Category</u>	<u>Part 36 Separations Basis</u>	<u>Part 69 Allocation Basis</u>
Marketing Expenses	Cost Study	COE+IOT+C&WF+GSF
Service Expenses - OB&C	Use Study	Limited to 5% to CL
Service Expenses - All Other	Cost Study	Cost Study
Executive & Planning Expense	Big 3 Expenses	Big 3 Expenses
General & Administrative Exp.	Big 3 Expenses	Big 3 Expenses
Other Operating Taxes	2001	COE+IOT+C&WF+GSF
Investment Tax Credit	2001	COE+IOT+C&WF+GSF
Funds During Construction	2004	COE+IOT+C&WF+GSF
Contributions	Corporate Expenses	COE+IOT+C&WF+GSF
Interest on Capital Leases	2680 -Capital Leases	COE+IOT+C&WF+GSF
Other Interest & Related Items	Net Telecommunication Plant	2001 or Net Investment
Other Jurisdictional Assets	Cost Study	Cost Study
Other Jurisdictional Liabilities & Deferred Credit - Net	Cost Study	Cost Study
Investment Allowance/ Disallowance	2001	COE+IOT+C&WF+GSF
Capitalized Payroll	2001	COE+IOT+C&WF+GSF
Depreciation Adjustment	2001	COE+IOT+C&WF+GSF
Expense Allowance/Disallowance	2001	COE+IOT+C&WF+GSF
Customer Deposits	2001 Excluding Land	COE+IOT+C&WF+GSF
Accumulated Depreciation Allowance/Disallowance	2001 Excluding Land	COE+IOT+C&WF+GSF
FIT Allowance/Disallowance	2001	COE+IOT+C&WF+GSF

C. Outlier Accommodation Methods

In constructing average schedule study regression and ratio models, influential data points that were considered to be non-typical of average schedule companies or that have an undue influence on estimated model parameters are present in the data. Since its 1998 filing, NECA has employed an Outlier Accommodation Method (“Method”) to moderate the impact of these influential points in model development. **This** Method responds to FCC concerns raised in the June **1998** Order’ that recommended NECA use a more accurate and consistent method to address outliers.

The inclusion of influential points in Average Schedule Study regression and ratio estimate models is a **two** step process involving: (1) identification of influential points, and (2) accommodation of influential data in model development.

1. Outlier Accommodation Method in Regression Models

a. Identification of Outliers in Regression Models

There are numerous methods available in statistical literature⁶ to identify influential data points in linear regression models. NECA adopts the DFFITS measure **of** influence proposed by Belsley⁷. The DFFITS statistic is a scaled measure of the

⁵ NECA Proposed Modifications to the 1998-99 Interstate Average Schedule Formulas, AAD 98-20, Order, 13 FCC Rcd 17351 (1998) (*June 1998 Order*).

⁶ A good comparison study can be found in Chatterjee, S. and Hadi, A.S. “Influential Observations, High Leverage Points, and Outliers in Linear Regression”, *Statistical Science*, 1986, Vol. 1, No. 3, pp. 379-416.

⁷ Belsley, David A., (et al.), *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity*, John Wiley & Sons 1980.

influence on the predicted value for the *i*th observation and is calculated by deleting the *i*th observation from the regression data. This calculated statistic is obtainable only from classical linear regression models.' Large values of DFFITS indicate influential observations. A distinct size-adjusted absolute cutoff point can be defined. The cutoff point is used to distinguish high influence points from others?

The cutoff point suggested by Chatterjee¹⁰ is defined as

$$C = 2 \sqrt{\frac{P+1}{N-P-1}}$$

where

P = number of model coefficient

N = number of observations included in model

b. Accommodation of Outliers in Regression Models

Outlier accommodation methods have the purpose of diminishing the variance of estimates by reducing the impact of influential data on models. Statistical texts conclude that methods of weighted regression will optimize the variance of a model if each point is given a weight in inverse proportion to its contribution to total model

⁸ For non-linear models, an additional step is required before using the Outlier Accommodation Method. See Section W.B.

⁹ **AS** Belsley points out that DFFITS is “a *t*-like diagnostic. . . . (that) has been scaled by an appropriate estimated standard error, which, under the Gaussian assumption, is stochastically independent of the given diagnostic.” As such, a distinct size-adjusted absolute cutoff point can be defined. *Id.* at p. 28.

¹⁰ Chatterjee, S., and Hadi, A.S., Sensitivity Analysis in Linear Regression, John Wiley & Sons 1988, pp. 121-122.

variance. In other words, if the weights for the observations are proportional to the reciprocals of the error variances, then the weighted least-squares estimates are Best Linear Unbiased Estimators."

NECA uses variance weights as follows:

$$\begin{aligned} &\text{If } DFFITS_i \leq C, \text{ Then Variance Weight}_i = 1 \\ &\text{Else Variance Weight}_i = \left(\frac{C / 2}{DFFITS_i} \right)^2 \end{aligned}$$

where C is the cutoff point.

The numerator of the variance weight is the median DFFITS value of points which are not influential. Thus, this variance weight compares a point which is influential to points which are not influential. Exhibit 4.2 is a graph that illustrates these variance weights. Using weights obtained by this method, weighted regression models were developed.

¹¹ See Draper, Norman (et al.), *Applied Regression Analysis*, John Wiley & Sons, 1966, pp. 108-115, and Judge, George (et al.), *The Theory and Practice of Econometrics*, John Wiley & Sons, 1980, pp. 420-421.